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User friendly Multispecies Fisheries Models

•USS JOHN POPE

SEVENTH FRAMEWORK PROGRAMME

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The May 2014 Stake Holders Meeting

YOU WERE MOST CONCERNED WITH

1. **Need to achieve Fmsy**
2. **Landings Obligation**
3. **The Risks of Incompatible Regulations**

YOU WANT (I think)

A case study of the N.Sea Multispecies Fish System that helps clarify 1, 2 and 3 possibly with more detail for Pelagics

Co-creation =

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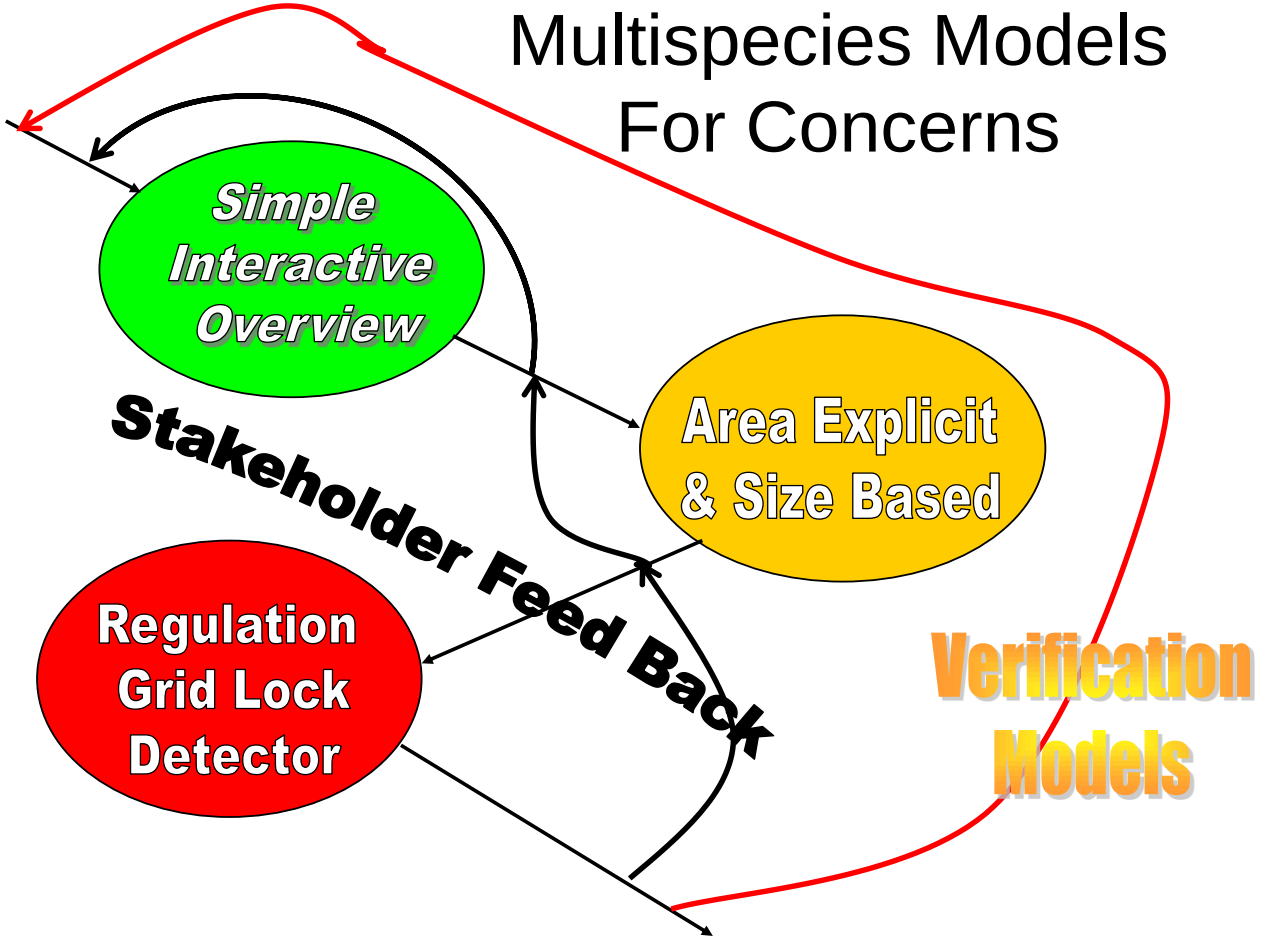

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From Brander and Bennett 1986

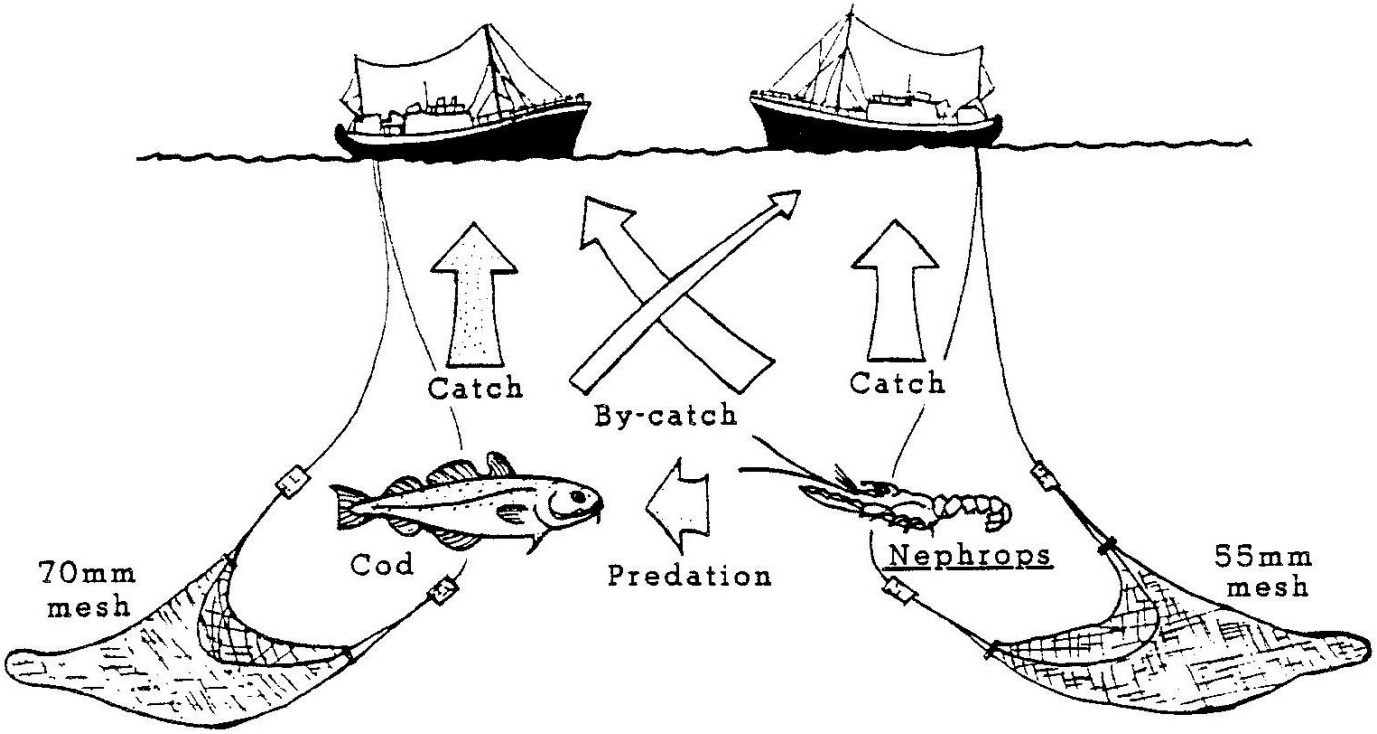
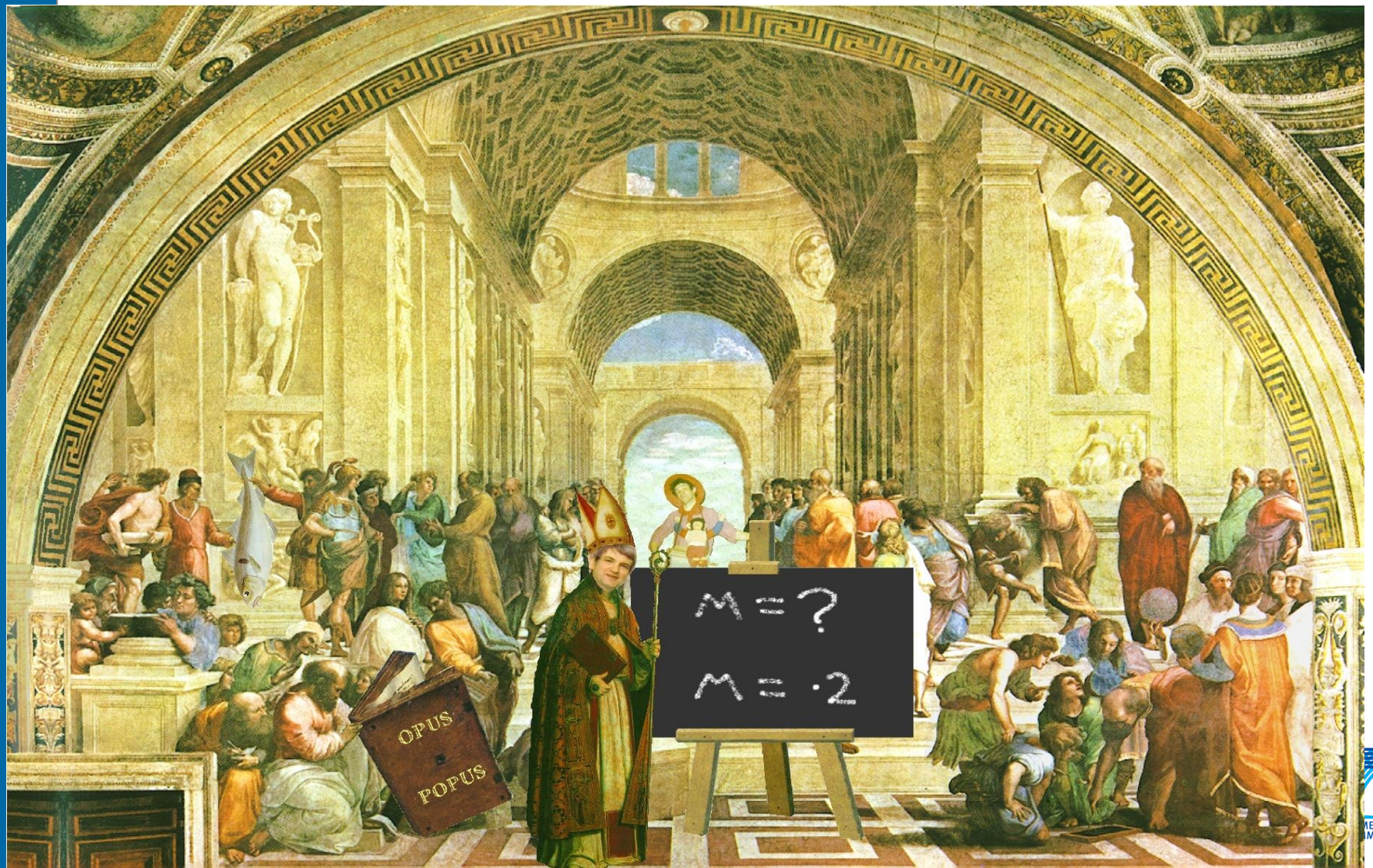


FIG. 2. Schematic representation of the biological and technical interactions between *Nephrops* and cod.

The Assumption of Pope John: Natural Mortality Rate



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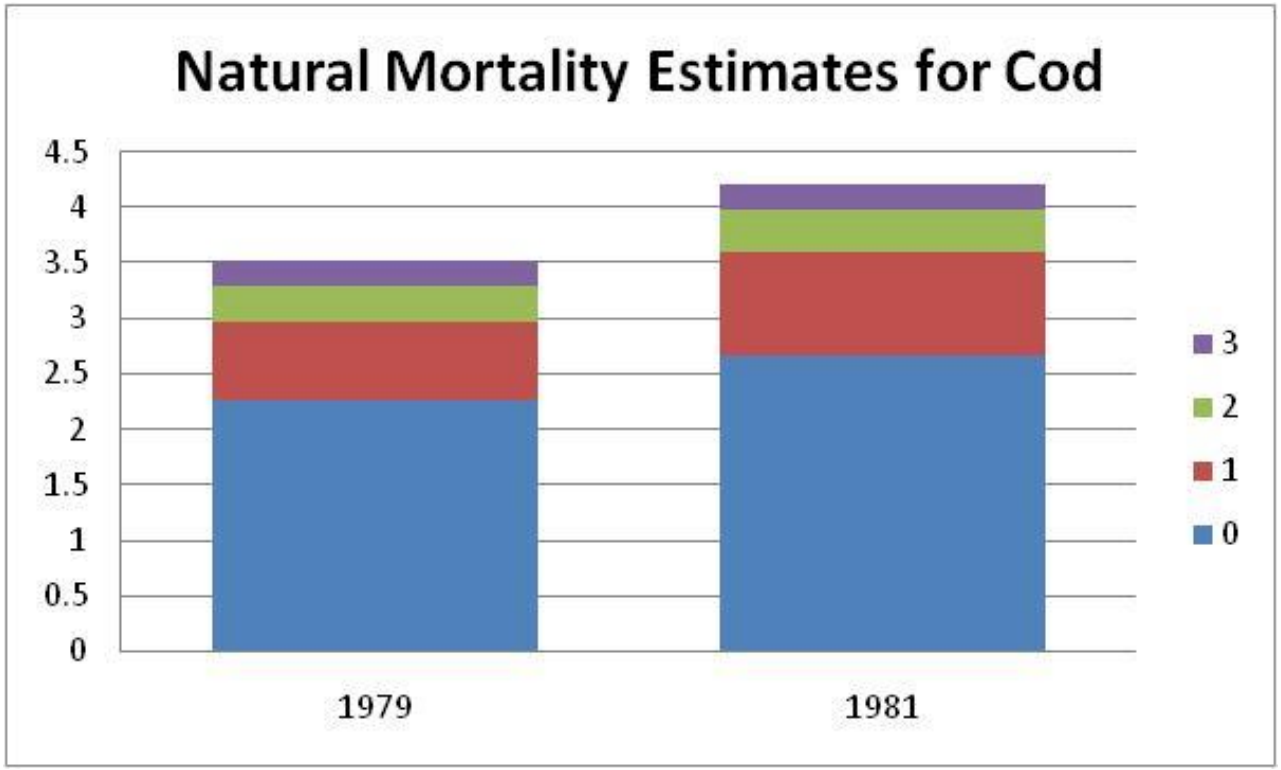
Natural Mortality varies with age but also year



Of a 1000 6month old recruits, 66 would survive at 1979 rates, **but** only 33 at 1981 rates.

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The Managers View:- Brugge and Holden 1991

…fleet-interaction models represent a progressive step in the evolution of fisheries management...

…species-interaction models represent an evolutionary jump.
…they do not provide a satisfactory basis for management in their present state of development …
and the present state of dialogue, or lack of it, between managers and fishermen.

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Requirements

Its Structure should:-

- Take Account of Species Interactions and Technical Interactions
- Handle the main range of TAC species.
- Allow fishing to be changed in realistic ways

Its Outputs should include the important trade offs:-

- Species Yield
- Fleet Economics
- Social implications
- Ecosystem Effects

Most of all it <u>MUST BE</u>:-

- Transportable, Easy to understand and Responsive.

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Transportable, Easy to understand and Responsive.

Must Run Fast

So Use Simple Approximation to the ICES SMS Model

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Simple Interactive Overview

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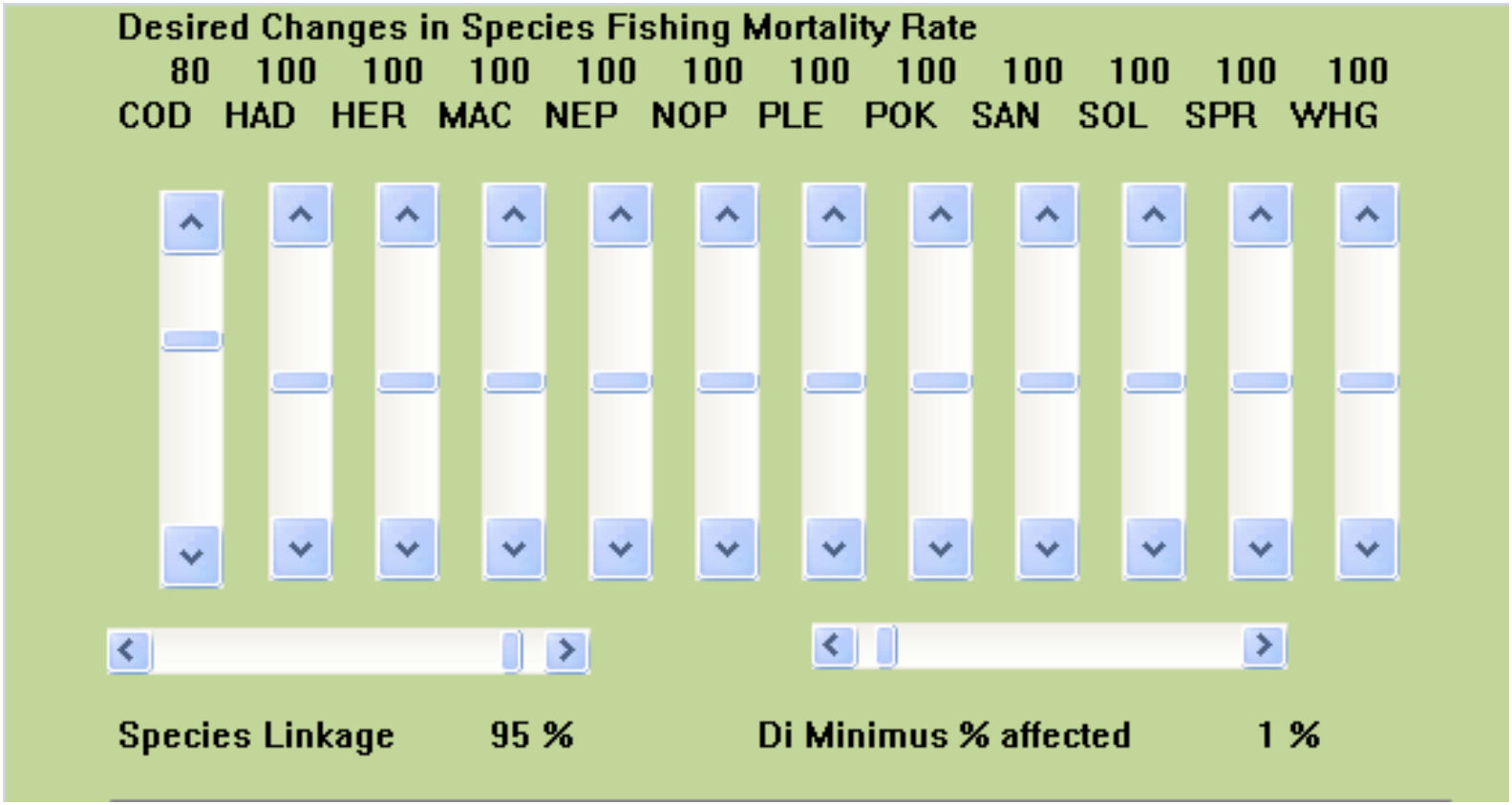
Changing The amount of Fishing



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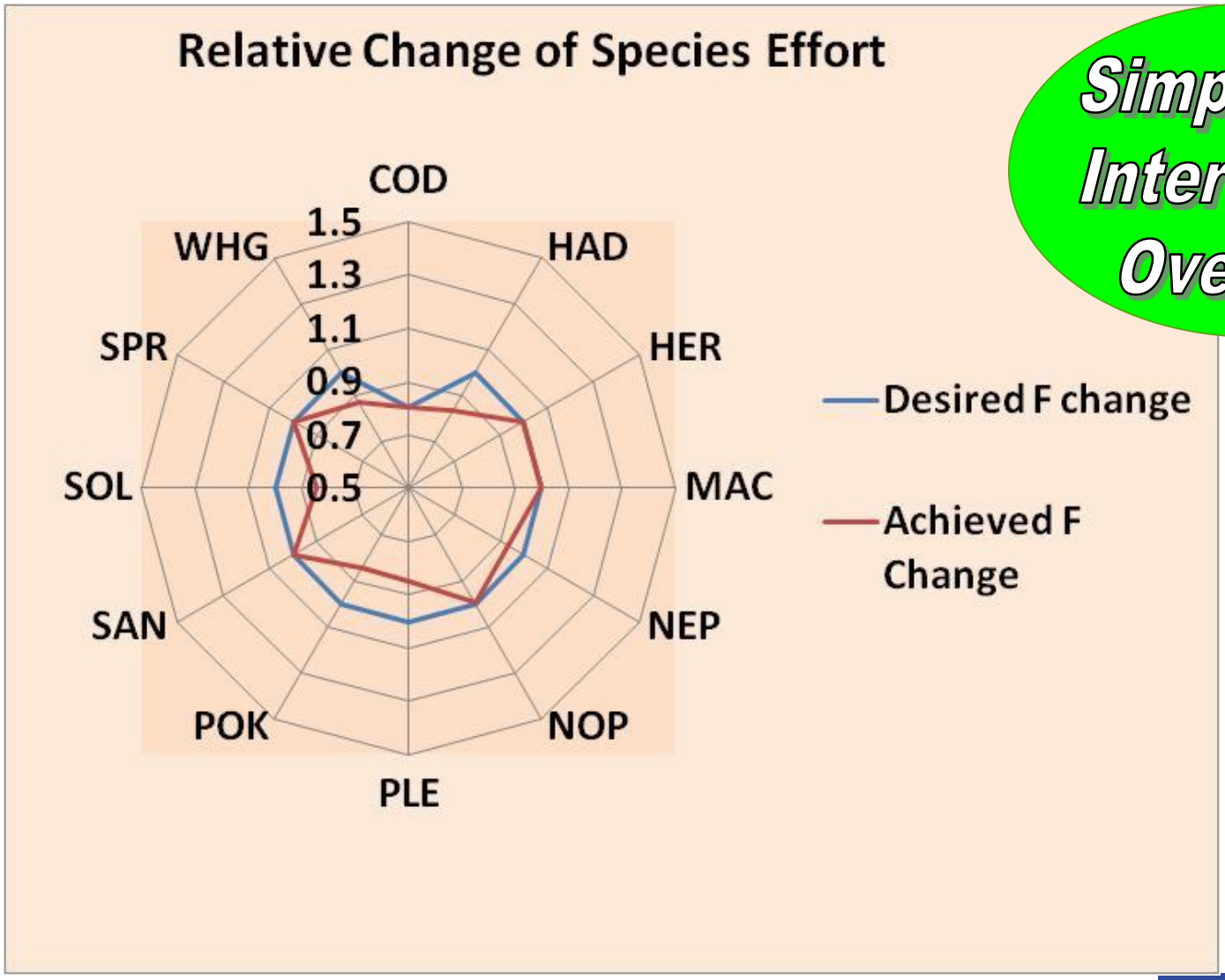

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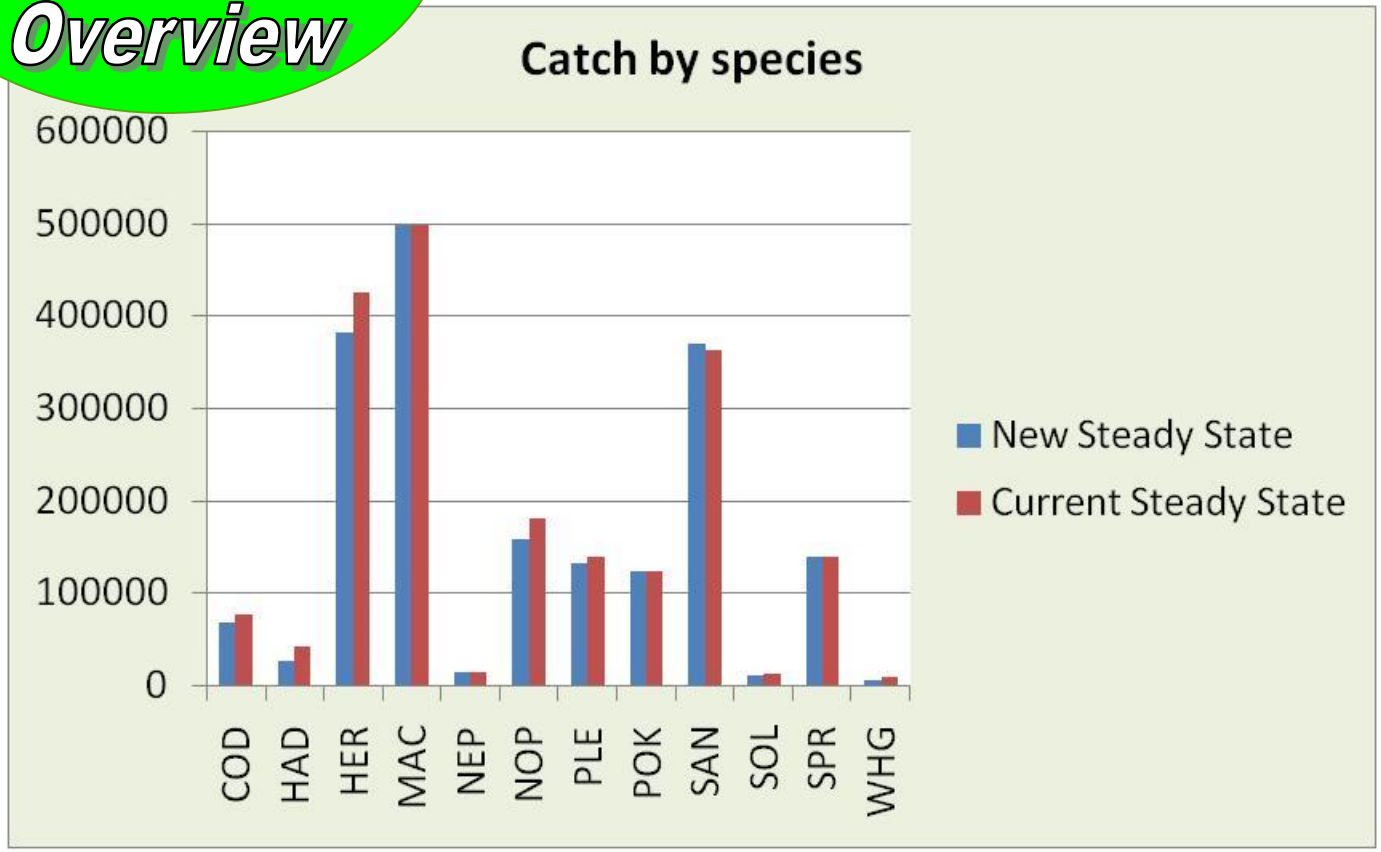
Results I



Bottom Disturbance
0.87

Charismatic by catch
1

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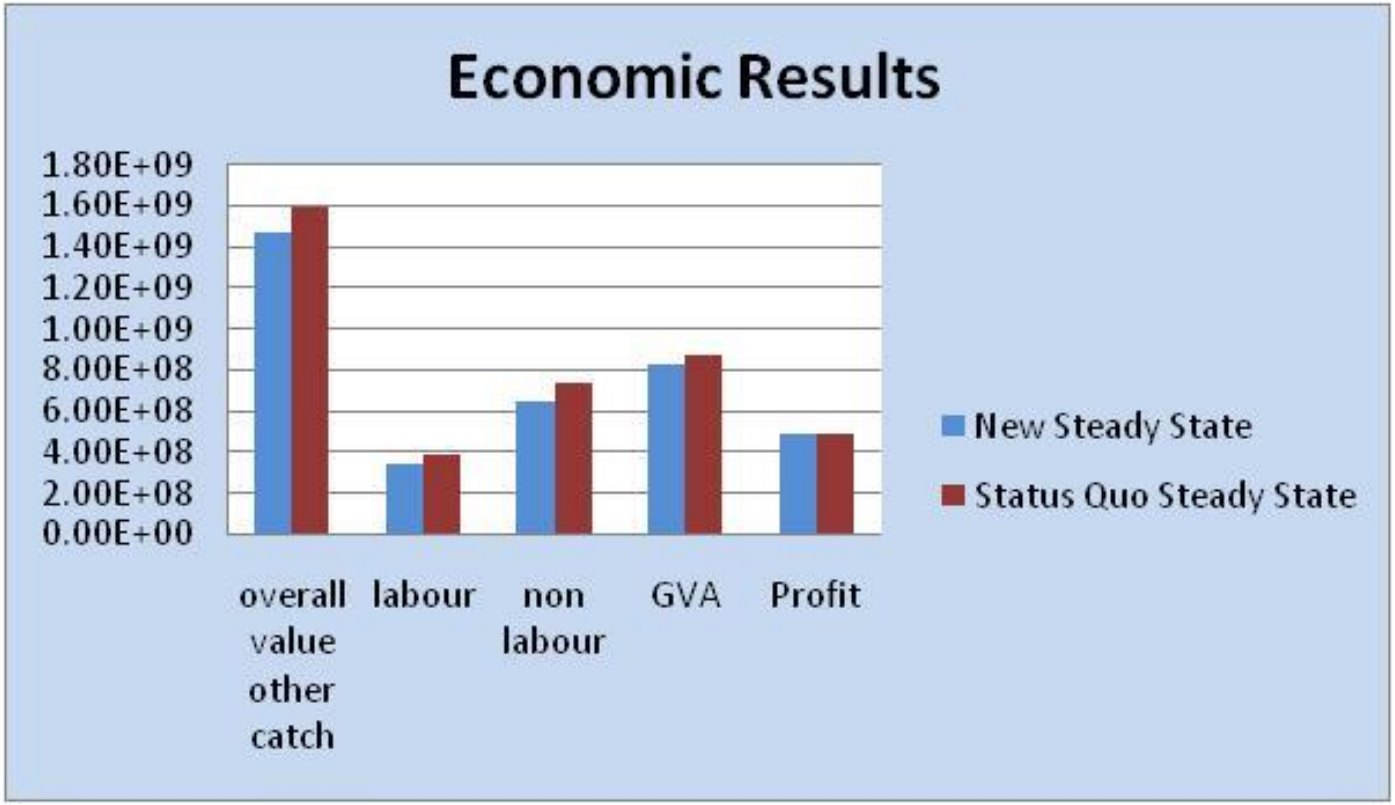
Results II



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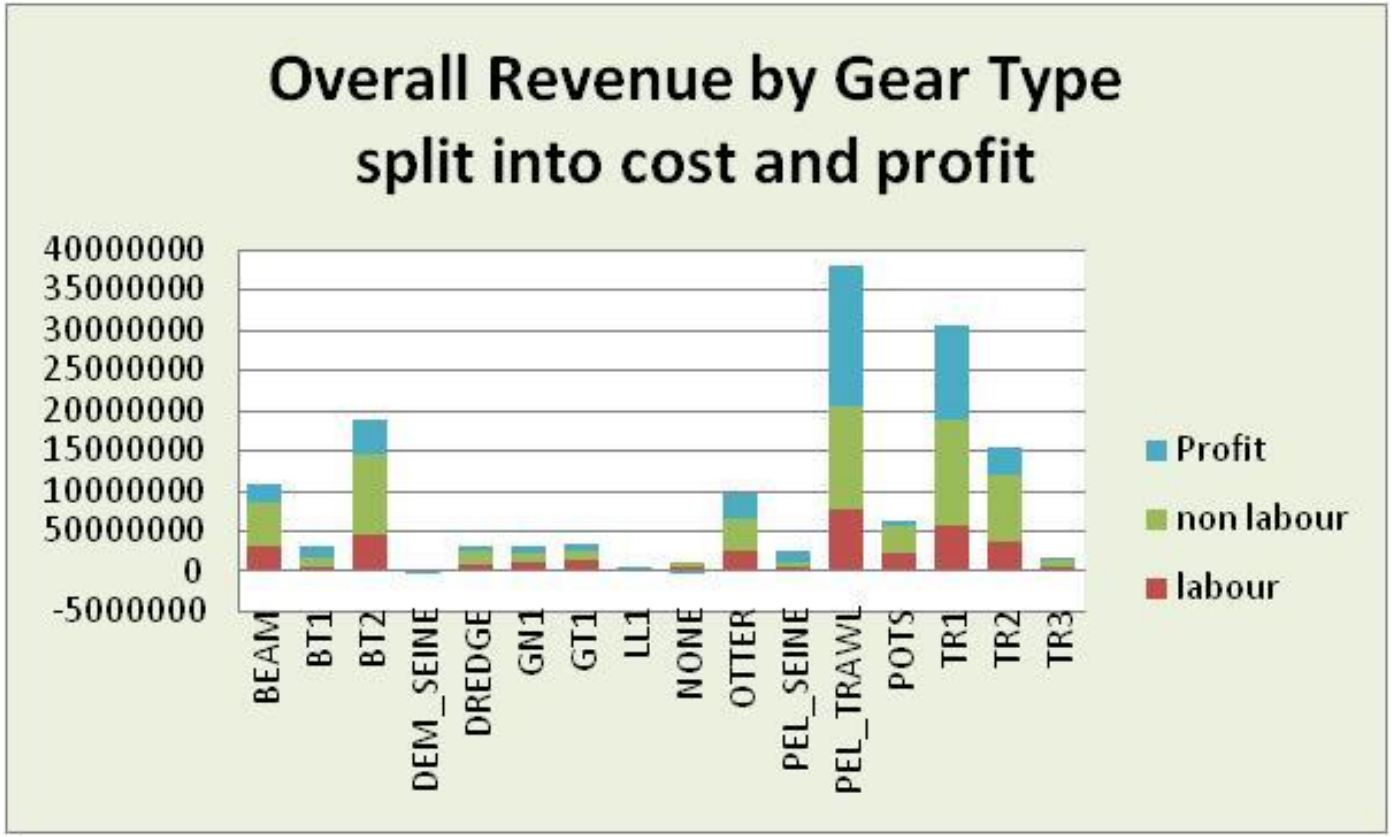
Results III



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Decision support

- **Structured approach to compare / evaluate alternatives**
- **Facilitate communication about choices and reasons**
- **Understand (potentially resolve) conflicts of interest**

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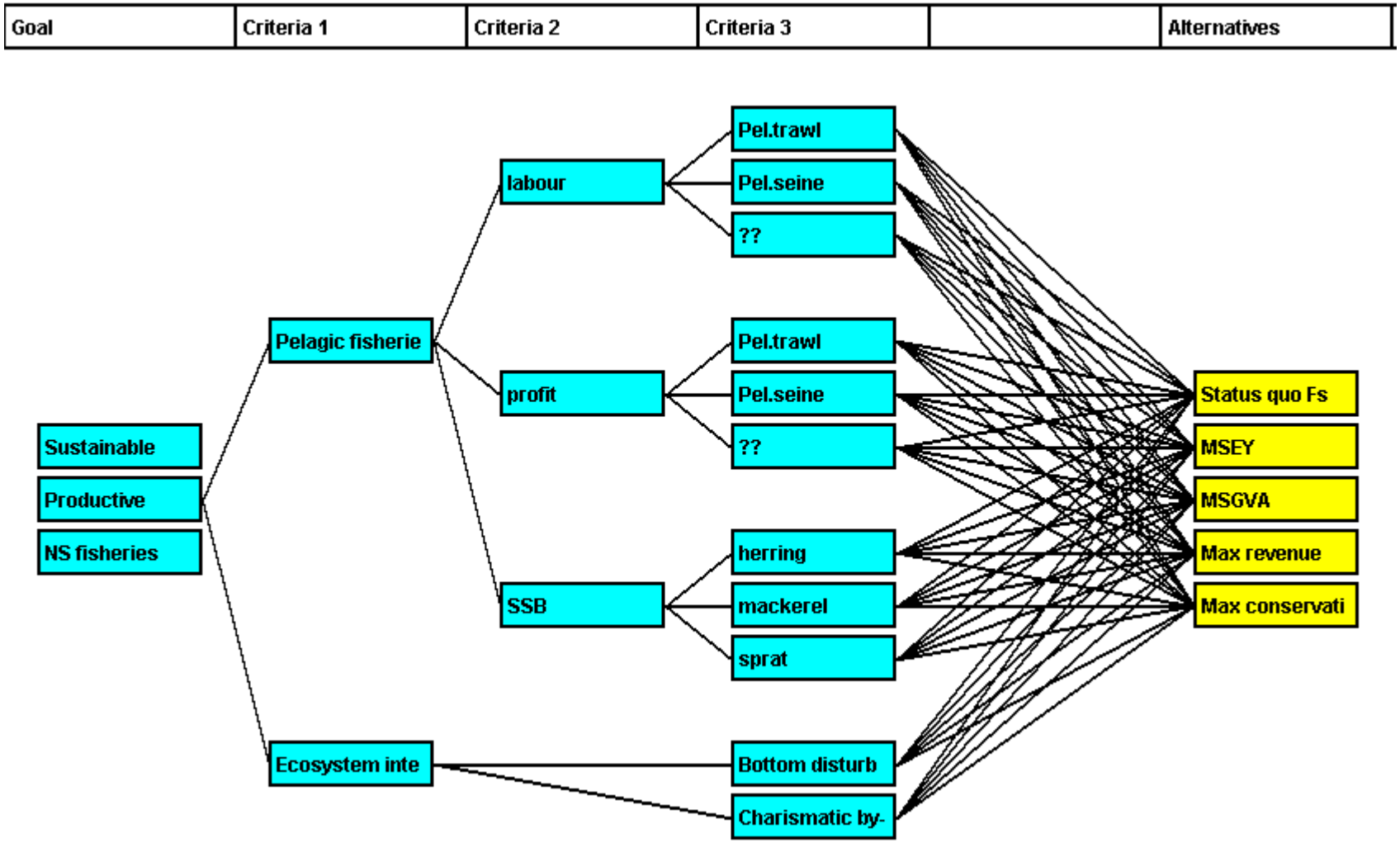
Using the MCA tool: the value tree

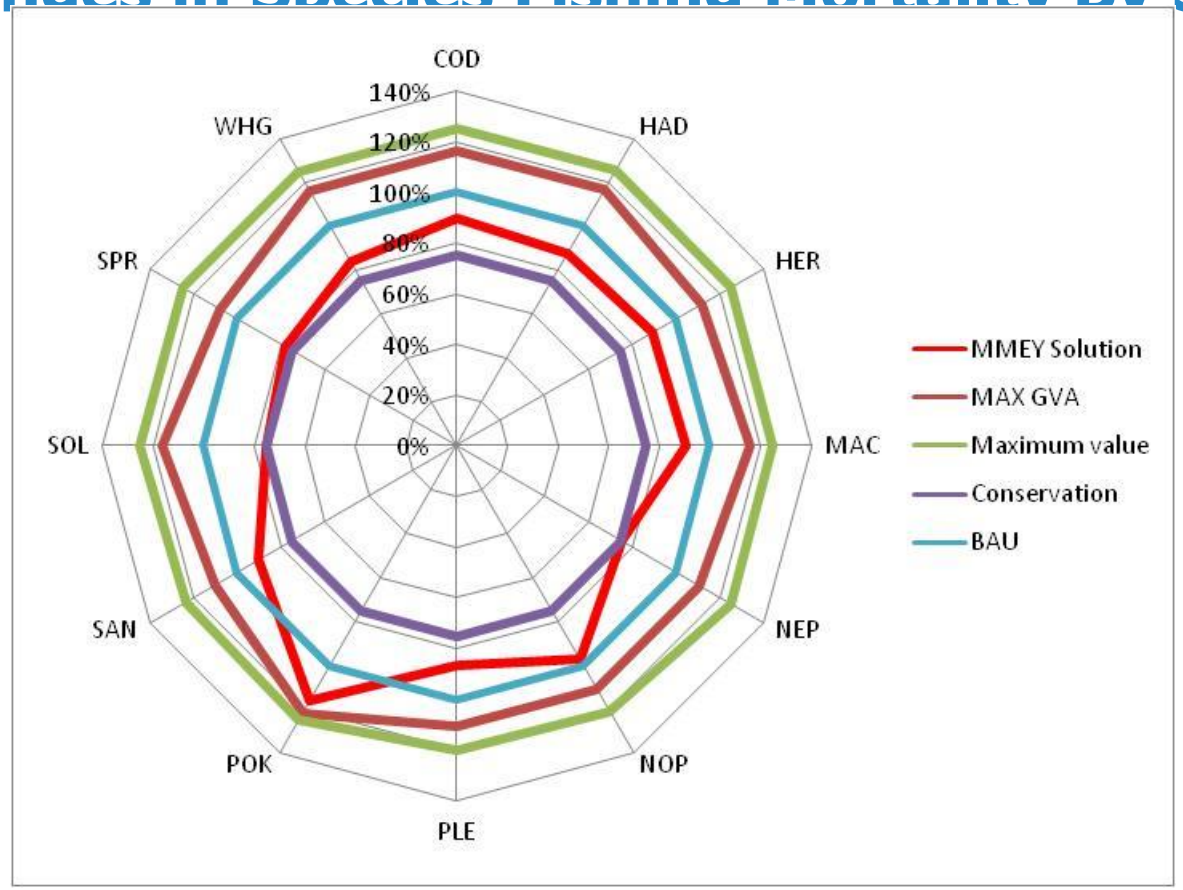


The FIVE SCENARIOS

Maximum Overall Profit ie MEY
Maximum Gross Value Added
Maximum First Sale Value Possible interpretation of MMSY
Conservation Scenario = Drop Fishing Mortality of all Spp. to 75%
Business as usual = Keep Fishing Mortality at Current Level

NB! All Scenarios Are Constrained By the Model To Stay In The 75% to 125% Range Of Fishing Mortality For All Species.

% Changes in Species Fishing Mortality By Scenario



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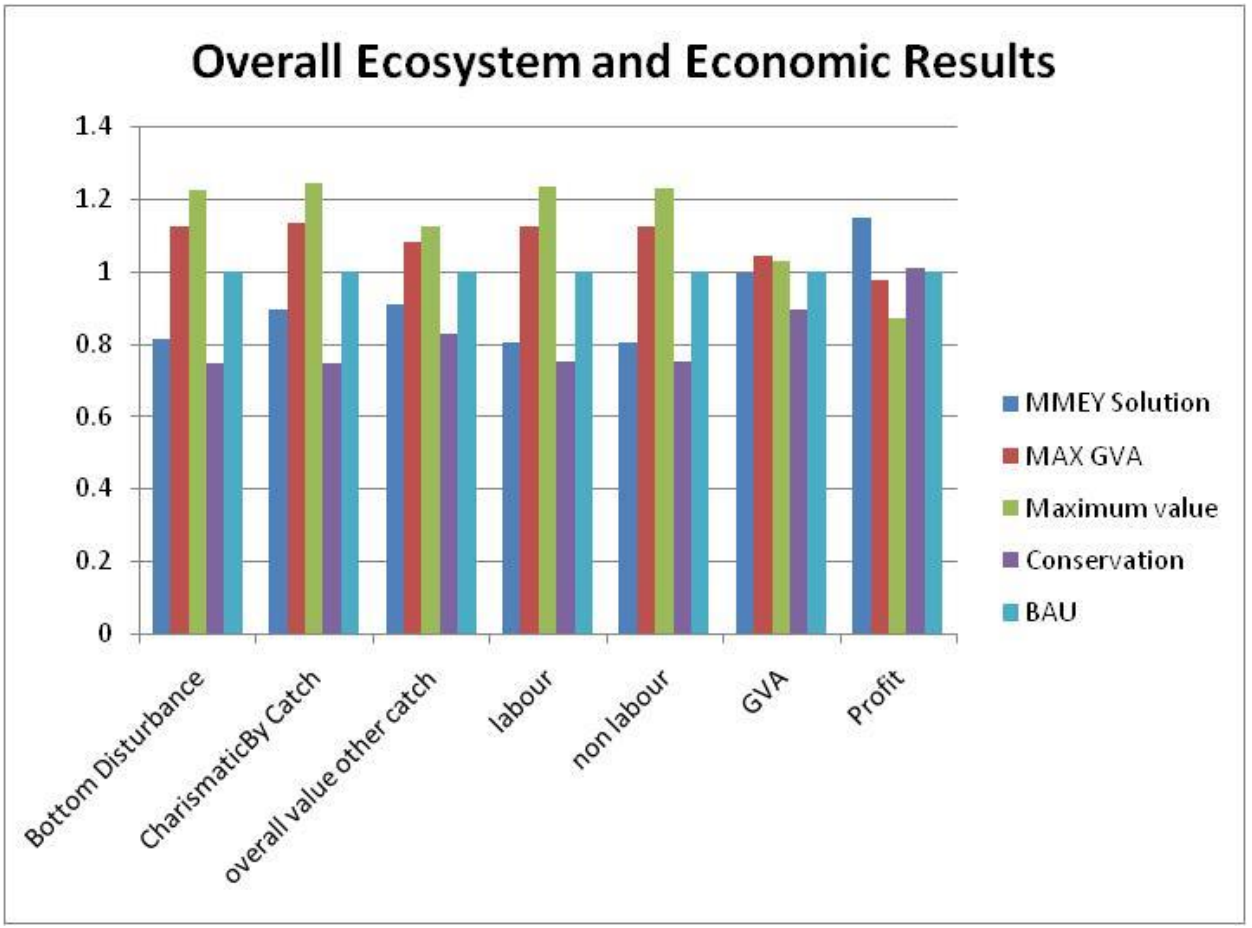

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Where to next

Check validity of Schaefer approximation. **Approach**

- **Fit to wider range of output of SMS and of other Models.**

Get it to handle Mesh Change. **Possible approach**

- **Use Pope 1989 method of estimating Jacobian Matrix of surface from partial F's and M2's**

Transient Behaviour. **Possible approach**

- **Use steady state parameters as first approximation then use Multispecies Schaefer differential equation to fit time series with modest changes.**

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How to tackle the Amber Model?

Broad Requirements as Green Model but with area and size.

- **Need to include possibility for area closure**
- **Need to include some species as multiple stocks (e.g. Nephrops)**

Possible Approach.

- **Attempt an area and sized based model based upon SMS or similar overall model results. These would then be partitioned by fleet rectangle data and by survey data.**

- **Yes I know this sounds Heroic!**

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How to tackle the red model?

- Use previous two models to see when and where regulations cause problems.
- Collaborate closely with SAF21 Project (Social Science Aspects of Fisheries for the 21st Century).
- Prayer

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THE END